WestFest
SCIENCE & SUSTAINABILITY
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Solar Oven

This activity was adapted from the S'mores Activity at NASA's Climate Kids (https://climatekids.nasa.gov/smores/). Climate Kids is produced by the Earth Science Communications Team at NASA's Jet Propulsion Laboratory / California Institute of Technology.

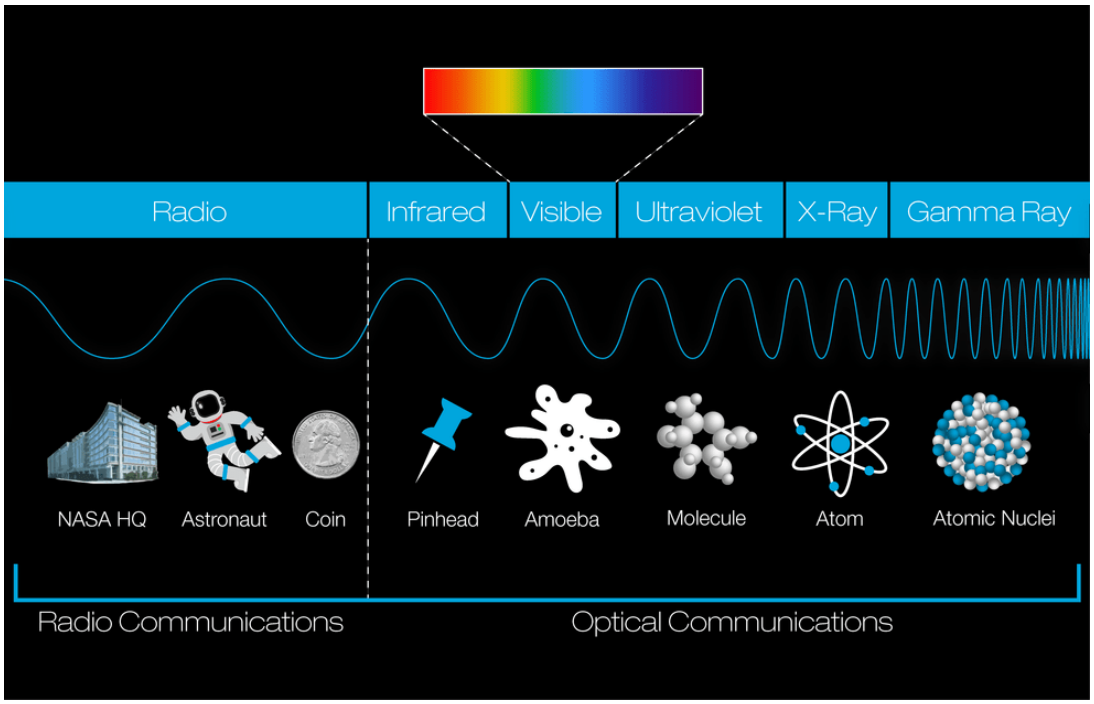
Materials

WestFest kit box	Aluminum foil	Wooden skewer
Glue stick	Sheet protector	Circle stickers or tape
Black paper	Scissors or utility knife (not included)	

The science of a solar oven

The Sun is the star at the center of the Solar System. It gives off the light we need to grow plants and keep the Earth warm. The Sun gives off all types of light, including types of light that we cannot see. We see Visible Light, which can be broken up into the colors of the rainbow. If we had magic eyes that could see all colors of light, we would see gamma rays, x-rays, ultraviolet, visible, infrared, and radio light. Light is a type of energy that can travel through space until it is absorbed by an object. When the light energy is absorbed, that energy is added to the object.

We use different types of light for different purposes in our lives. X-rays are used to see the bones inside of our bodies. Ultraviolet or UV light is used to kill germs and disinfect surfaces. Infrared light can detect heat and be used for night vision goggles. Radio light is what we use when we connect to WiFi or use our cell phones.



Wavelengths of light compared to objects we may know of. Credit NASA

Now that you know a bit about light, ask yourself - How can I make an oven that uses light to cook food? Some objects let certain types of light pass through them, and others block certain types of light. We use this to our benefit when we put on sunscreen or make a greenhouse. Sunscreen blocks UV light and protects our skin from sunburn and damage. Greenhouses made of glass let visible light through, but block infrared light from leaving quickly. This keeps the greenhouses warm and allows us grow plants in places they normally wouldn't grow. This is the property of light you will use for your solar oven.

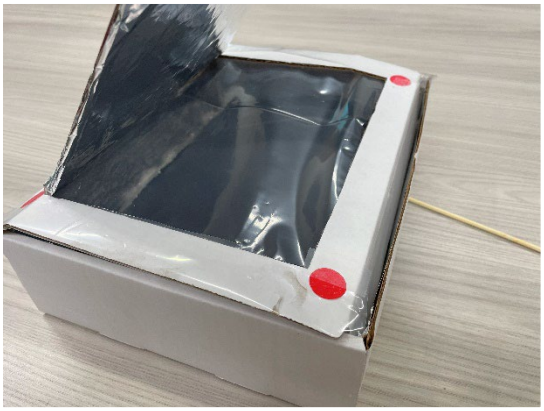
You will use the WestFest kit box to make a solar oven, like the one pictured above, that can be used to cook yummy snacks - like a S'more. The components of the solar oven are simple! You'll use a box with foil to gather energy and a sheet protector to hold in the heat. Next, you'll test if the temperature has increased by adding something delicious and seeing if it melts.

Making your solar oven

1. Start by gathering all the materials listed on the front page of this activity.
2. With the WestFest kit box empty and closed, notice the drawn template on the top of the box.
3. Using a utility knife or a pair of scissors, carefully cut all the way through the cardboard box along the drawn template.


4. Once the three sides of the box are cut, fold the flap back slightly along the attached side, creating an open flap on the top of the box.
5. Next, you will need to cover the flap as well as the entire inside of the box with aluminum foil. The foil can be glued onto the box with the glue stick. As you work with the aluminum foil, try to keep the foil as smooth as possible.
    a. Start by covering the bottom (inside) of the flap with aluminum foil.
    b. Then, use the rest of the aluminum foil to line the entire inside of the box, including the bottom and the four sides.


6. Take a pair of scissors and cut the three-hole punch side and the attached bottom of the plastic sheet protector so it opens like a book as a single sheet of plastic.
7. Open the box lid (not the flap) and secure the plastic sheet on the inside lid by wrapping it over the top and taping it down with the provided circle stickers or your own tape. If you want to use plastic wrap instead, you can.
8. Fold and line the bottom of the box with black construction paper.

9. The last thing you will do is practice setting up your oven outside. Set the oven in the direct sunlight on a sunny day when the outdoor temperature is at least 85 degrees Fahrenheit. Prop the flap open using the wooden skewer or other object to reflect the sunlight into the box. You will probably have to tape the skewer in place.

Using your solar oven

1. Set up your solar oven outside with the lid closed and the flap propped open. Let the oven preheat for at least 30 minutes in direct sunlight.
2. While your oven preheats you can prepare the ingredients for a yummy snack. We recommend making a S'more since it has easily meltable ingredients. S'mores are usually made from graham crackers, marshmallows, and chocolate bars. Take a large piece of graham cracker and snap it in half. Place half of the graham cracker on a small plate, napkin, or piece of foil. Place a marshmallow on top of the graham cracker.

3. Open the box lid and place your snack in the solar oven. Adjust the aluminum foil-lined flap with the skewer to prop the flap at the correct angle so the sun reflects off the flap into the box.
4. Now wait until marshmallow or another snack becomes squishy. This may take 30 minutes to an hour.
5. Put your chocolate on top of the squishy marshmallow and add the other half of the Graham cracker. Let the S'more warm a bit longer so the chocolate melts.
6. Now enjoy your snack!

Extending your knowledge

There are many things you can do to experiment with your solar oven. Try making new solar ovens using different box sizes and shapes or try different building materials. For example, try putting in rolled up newspaper along the sides of your box to create better insulation. You can also measure the maximum temperature reached by your solar oven by using a thermometer. Can you make changes to your oven to make it heat up faster or reach higher temperatures? There's so much more to explore!